IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: West, *et al.* Art Unit: TBD

Serial No.: TBD Examiner: TBD

Filed: 5/24/2001 Attorney Docket: COM002.1

For: Bandwith Efficient QAM on a TDM-FDM System for Wireless Communication

PRELIMINARY AMENDMENT

Assistant Commissioner for Patents
BOX PATENTS
Washington, DC 20231

MAILING CERTIFICATE UNDER 37 C.F.R. §1.8(A)

I hereby certify that on this date, the above correspondence is being deposited with the US Postal Service as "Express Mail Post Office to Addressee" addressed to: Box Patents, Assistant Commissioner for Patents, Washington, DC 20231.

Karen Fabritiis
Karen Fabritiis

5/24/01
Date

Dear Sir:

Prior to examination on the merits, please enter this preliminary amendment to the specification and claims.

In the specification:

ITEM ONE:

On page 1, please delete the paragraph beginning on line 4 and insert in its place the following paragraph:

> This application is a continuation of and incorporates by reference U.S. Patent Application No. 09/295,660, which application claims benefit of U.S. Provisional Application Serial No. 60/107,934 filed November 11, 1998, also incorporated herein by reference.

The following marked-up version of the paragraph demonstrates changes to the previous version.

> This application is a continuation of and incorporates by reference U.S. Patent Application No. 09,295,660, which application claims

benefit of U.S. Provisional Application Serial No. 60/107,934 filed November 11, 1998, also incorporated herein by reference.

ITEM TWO:

On page 4, please delete the paragraph beginning on line 6 and insert in its place the following paragraph:

> Another shortcoming of prior art devices is their limited ability to transmit only one type of information format (e.g. voice only, data only, voice and data) on a given channel. Because the prior art systems require the full channel bandwidth to transmit and because the receiving device must be programmed to recognize the type of information that is being transmitted on that channel, normally only one type of information can be transmitted on the channel at any given time.

The following marked-up version of the paragraph demonstrates changes to the previous version.

> Another shortcoming of prior art devices is their limited ability to transmit only one type of information format (e.g. voice only, data only, voice and data) on a given channel. Because the prior art systems require the full channel bandwidth to transmit and because the receiving device must be programmed to recognize the type of information that is being transmitted on that channel, normally only one type of information can be transmitted on the channel at any given time.

ITEM THREE:

On page 28, please delete the paragraph beginning at line 7 and insert in its place the following paragraph:

> Figures 8(c) through 8(e) illustrate base unit 102 operating in receiver mode. Fig. 8(c) provides a high level block diagram of the four sub-channel architecture. Signals from the terminal units are received by radio frequency (RF) receiving circuitry (not shown). A/D converter 840 receives the signal from the RF receiving circuitry and converts it to a digital signal, which is fed to each of the four sub-channel paths, 844, 845, 846, and 847.

The following marked-up version of the paragraph demonstrates changes to the previous version.

> Figures 8(c) through 8(e) illustrate base unit 102 operating in receiver mode. Fig. 8(c) provides a high level block diagram of the four sub-channel architecture. [.] Signals from the terminal units are received by radio frequency (RF) receiving circuitry (not shown). A/D converter 840 receives the signal from the RF receiving circuitry and converts it to a digital signal, which is fed to each of the four sub-channel paths, 844, 845, 846, and 847.

In the Claims:

Please cancel currently pending claims 1 through 29 and add the following new claims.

30. (new) A method of accommodating pre-defined channels of differing bandwidths without substantial retrofitting of communication system components, each pre-defined channel having a center frequency, comprising:

when broad pre-defined channels are available, transmitting N independent communication signals to N mobile units over a single broad pre-defined channel, each independent communication signal being broadcast at a pre-defined offset from the center frequency of the broad pre-defined channel;

when only narrow pre-defined channels are available, each narrow pre-defined channel having 1/M bandwidth of the broad pre-defined channel, transmitting N/M independent signals to N/M mobile units over each of M narrow pre-defined channels, each of the N/M independent signals being broadcast at a pre-defined offset from the center frequency of the narrow pre-defined channels;

wherein the pre-defined offsets from the center frequency of the narrow pre-defined channels is a sub-set of the pre-defined offsets from the center frequency of the broad pre-defined channel.

31. (new) The method of claim 30 wherein a mobile unit can be configured to accommodate a narrow pre-defined frequency channel by tuning the mobile unit to a new center frequency, but not changing the pre-defined offset from the center frequency.

32. (new) The method of claim 30 wherein a mobile unit can be configured to accommodate a narrow pre-defined frequency by changing the pre-defined offset from the center frequency to which the mobile unit is tuned.

33. (new) The method of claim 30 wherein N is four and M is two.

34. (new) The method of claim 30 further comprising, time division multiplexing each sub-channel into two or more time slots.

35. (new) The method of claim 30 wherein N is an integer multiple of M.

36. (new) The method of claim 30 wherein a broad pre-defined channel is 25 kHz.

37. (new) The method of claim 36 wherein a narrow pre-defined channel is 6.24 kHz.

38. (new) A radio system capable of accommodating pre-defined frequency channels of differing bandwidths, each pre-defined frequency channel having a center frequency, comprising:

a data source providing at least N independent communication signals;

a transmitter coupled to the data source and configured to transmit N independent communication signals to N mobile units over N sub-channels of a broad pre-defined frequency channel when available;

each of the N sub-channels having a frequency offset from the center frequency of the broad pre-defined frequency channel, but falling entirely within the bandwidth of the broad pre-defined frequency channel, and no two of the N sub-channels having the same frequency offset;

the transmitter being configured to transmit M independent signals to M mobile units over a each of a N/M narrow pre-defined frequency channels when a broad pre-defined frequency channel is unavailable, wherein N is an integer multiple of M;

each of the M sub-channels for each of the plurality of narrow pre-defined frequency channels having a frequency offset from the center frequency of the narrow pre-defined frequency channel, but falling entirely within the bandwidth of the narrow pre-defined frequency channel;

wherein the frequency offsets for the sub-channels of the narrow pre-defined frequency channels comprise a subset of the frequency offsets for the broad pre-defined frequency channel.

39. (new) The radio system of claim 38 further comprising:

N mobile units, each mobile unit configured to receive one of the N independent communication signals by being tuned to a particular pre-defined frequency channel and a particular frequency offset.

40. (new) The radio system of claim 39 wherein a mobile unit can be configured to accommodate a narrow pre-defined frequency channel by re-tuning either the center frequency or the offset frequency.

41. (new) The radio system of claim 38 wherein each sub-channel is time division multiplexed.

42. (new) The radio system of claim 38 wherein N is four and M is two.

43. (new) The radio system of claim 38 wherein the offset frequencies comprise plus or minus 2.4 kHz and plus or minus 7.2 kHz.

44. (new) The radio system of claim 38 wherein the pre-defined frequency channels are assigned by a governmental authority.

45. (new) The radio system of claim 38 wherein the N/M narrow pre-defined frequency channels occupy contiguous bandwidth.

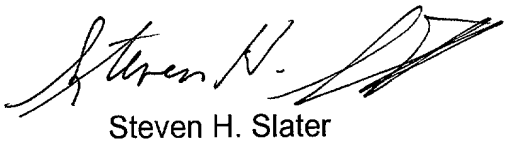
46. (new) The radio system of claim 38 wherein the data source is a public telephone network.

47. (new) The radio system of claim 40 wherein the mobile unit is configured via control signals broadcast by the base unit.

REMARKS

Applicants respectfully request examination on the merits of newly added claims 30 through 47. No new subject matter has been added through this amendment, but rather certain typographical errors in the specification were amended. Applicants respectfully submit the claims are in condition for allowance.

Respectfully submitted,



Steven H. Slater
Attorney for Applicants
Reg. No. 35,361

Slater & Matsil, L.L.P.
15150 Preston Road, Suite 300
Dallas, Texas 75248
(972) 401-9786 (telephone)
(972) 401-9787 (facsimile)

PTO/SB/21 (09-04)
Approved for use through 07/31/2006. OMB 0651-0031
U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	Randall J. West, et al.	Art Unit:	TBD
Serial No.:	TBD	Examiner:	TBD
Filed:	May 24, 2001	Docket:	COM002.1
For:	Bandwidth Efficient QAM on a TDM-FDM System for Wireless Communications		

TRANSMITTAL OF FORMAL DRAWINGS

Assistant Commissioner For Patents
Washington, D. C. 20231

Attn: Official Draftsperson

MAILING CERTIFICATE UNDER 37 C.F.R. §1.8(A)
I hereby certify that, on or before the undersigned date, the above correspondence is being deposited with the U.S. Postal Service as Express Mail in an envelope addressed to Assistant Commissioner for Patents, Washington, DC 20231.

Karen Fabritiis 5/24/01
Karen Fabritiis Date

Dear Sir:

Attached are eleven (11) sheets of formal drawings for the above-referenced application.

Respectfully submitted,

Steven H. Slater
Attorney for Applicants
Reg. No. 35,361

Slater & Matsil, L.L.P.
15150 Preston Road, Suite 300
Dallas, Texas 75248
(972) 401-9786 (telephone)
(972) 401-9787 (facsimile)

FIG. 1a

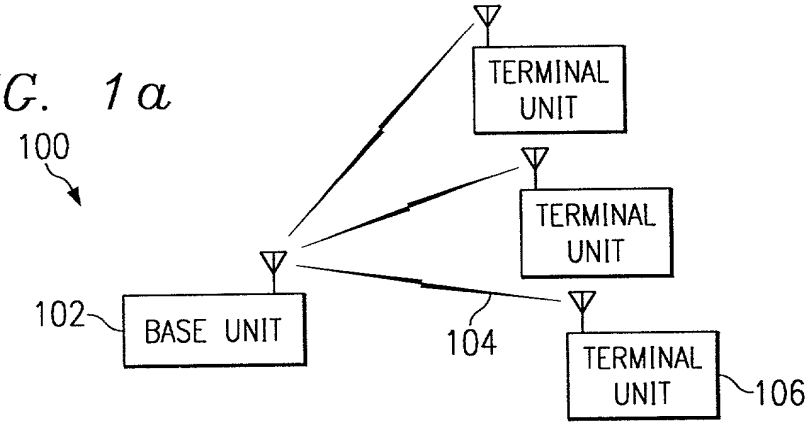
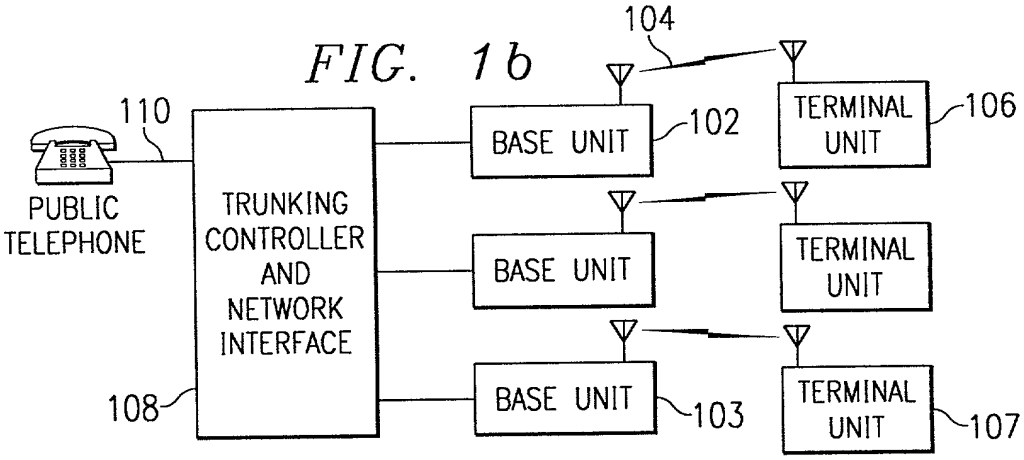


FIG. 1b



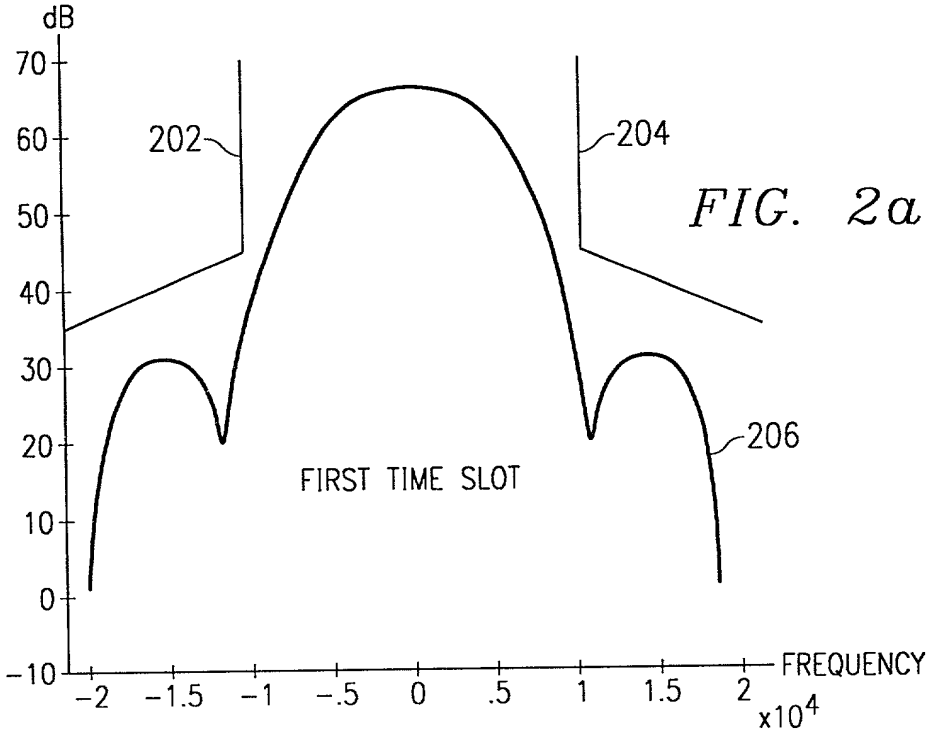


FIG. 2a

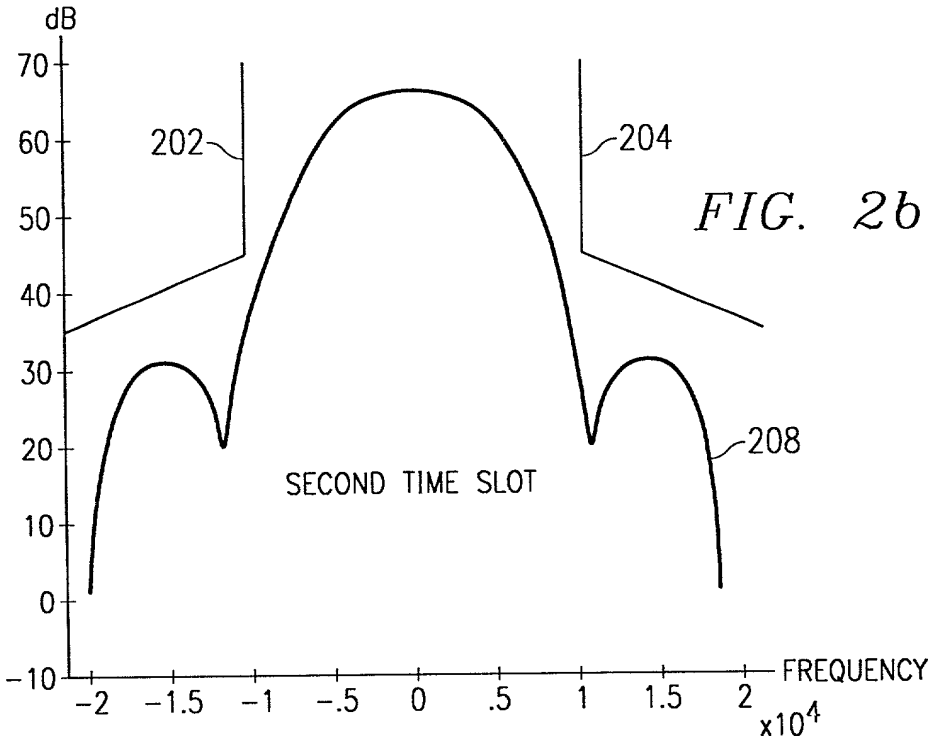

dB
70
60
50
40
30
20
10
0
-10
202
204
208
SECOND TIME SLOT
-2
-1.5
-1
-.5
0
.5
1
1.5
2
FREQUENCY
x10^4

FIG. 2b

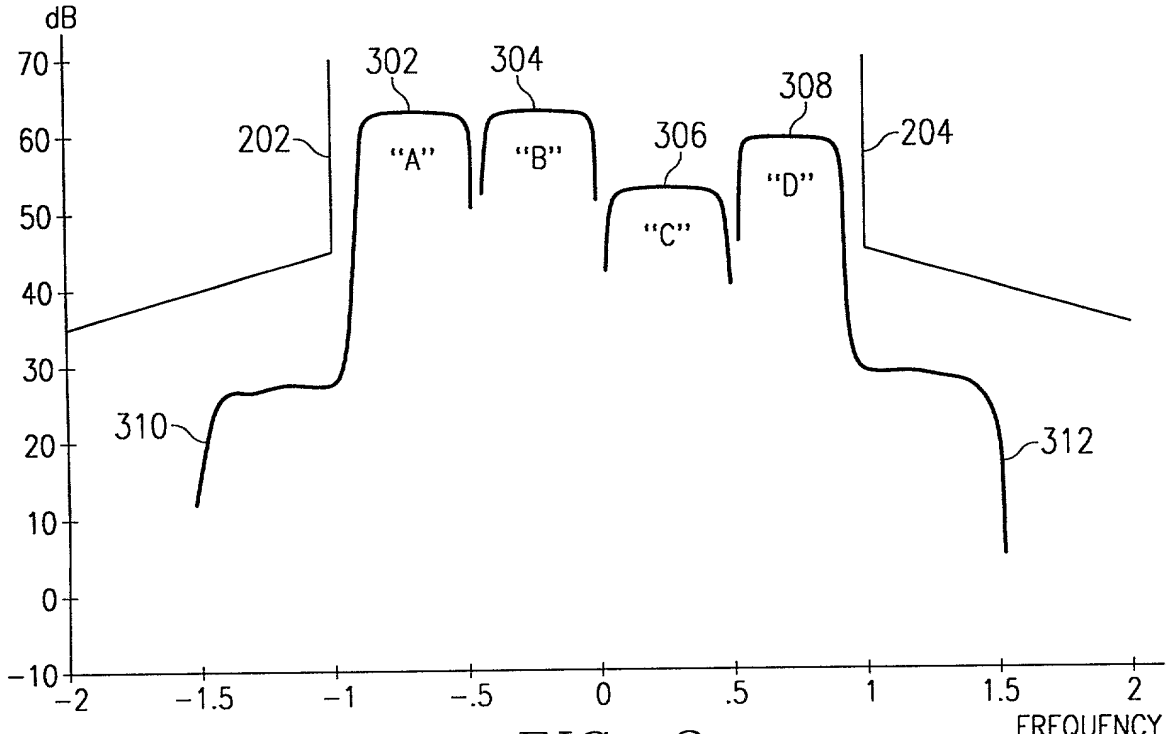

dB
70
60
50
40
30
20
10
0
-10
202
302
304
306
308
204
"A"
"B"
"C"
"D"
310
312
-2
-1.5
-1
-.5
0
.5
1
1.5
2
FREQUENCY

FIG. 3

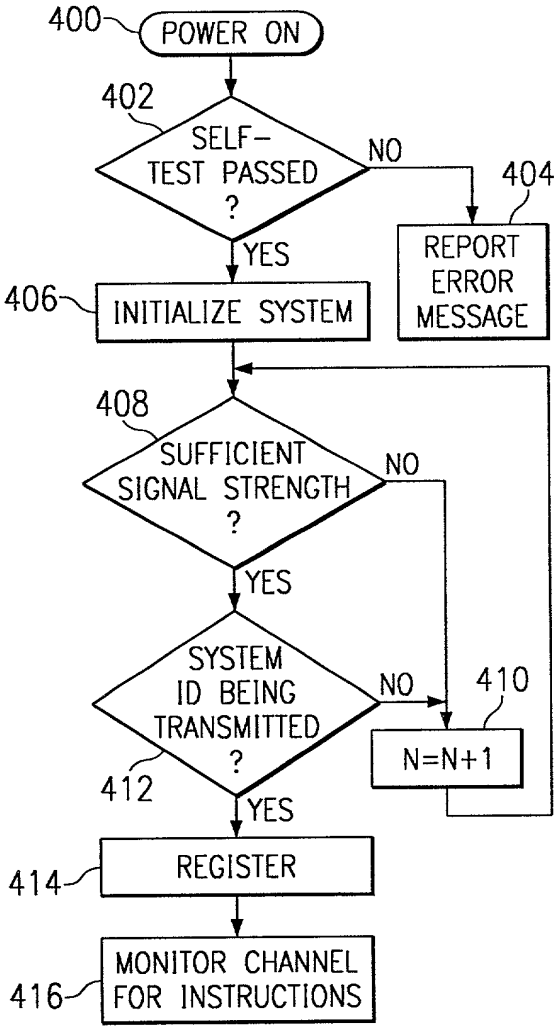


FIG. 4a

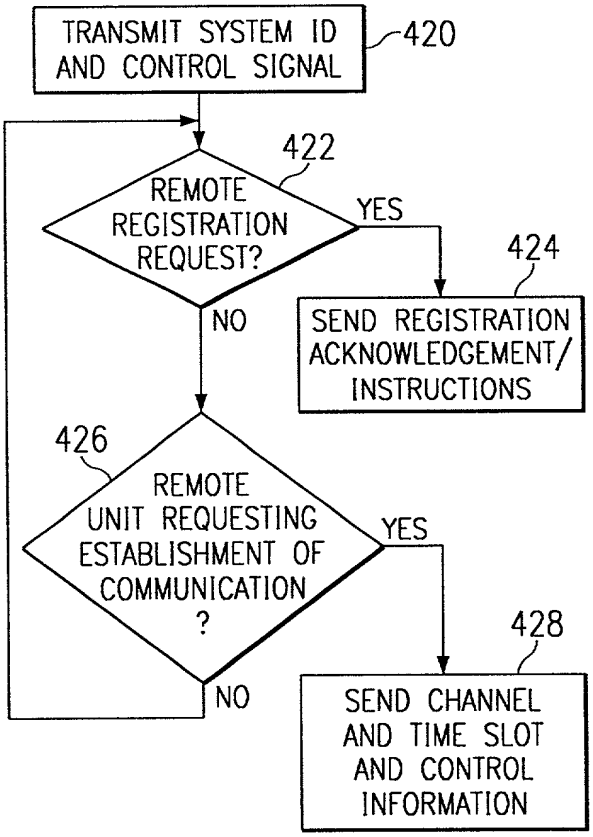


FIG. 4b

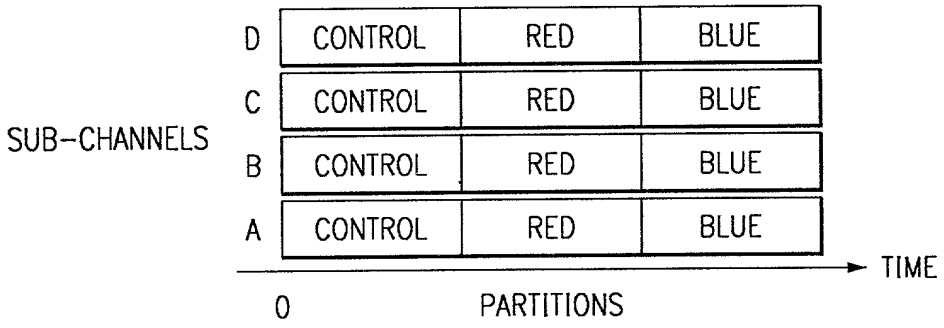


FIG. 5a

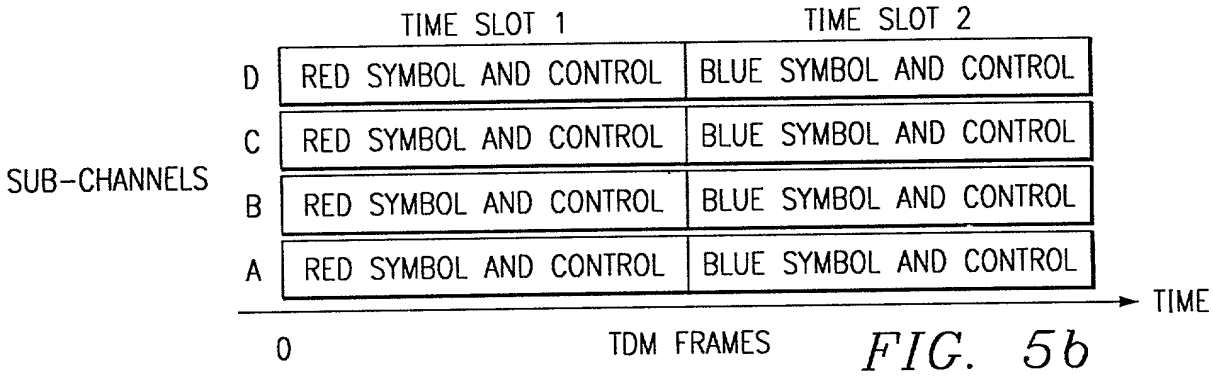


FIG. 5b

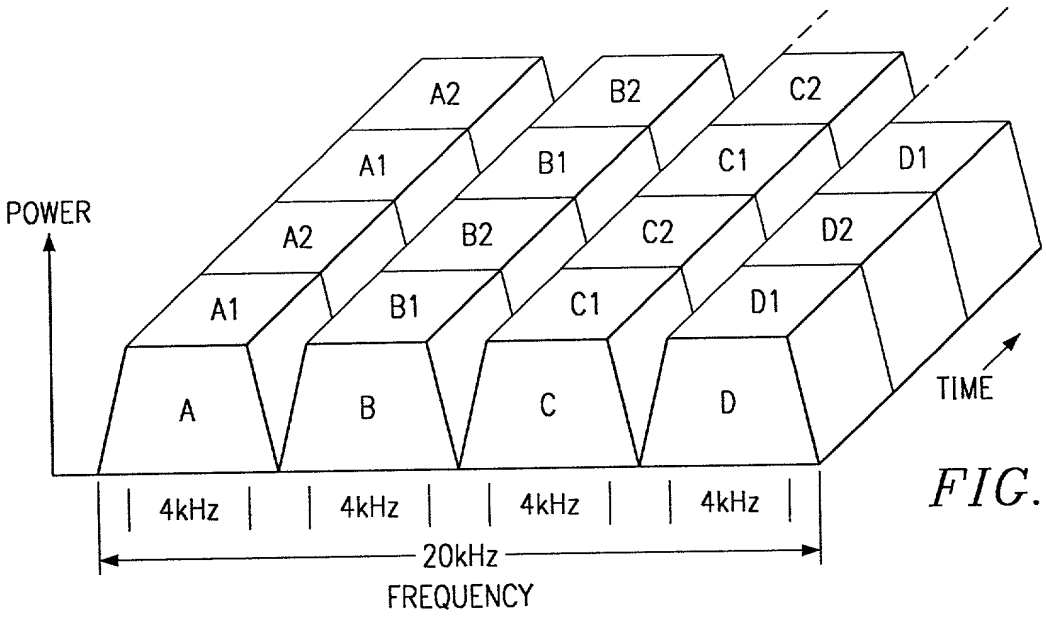
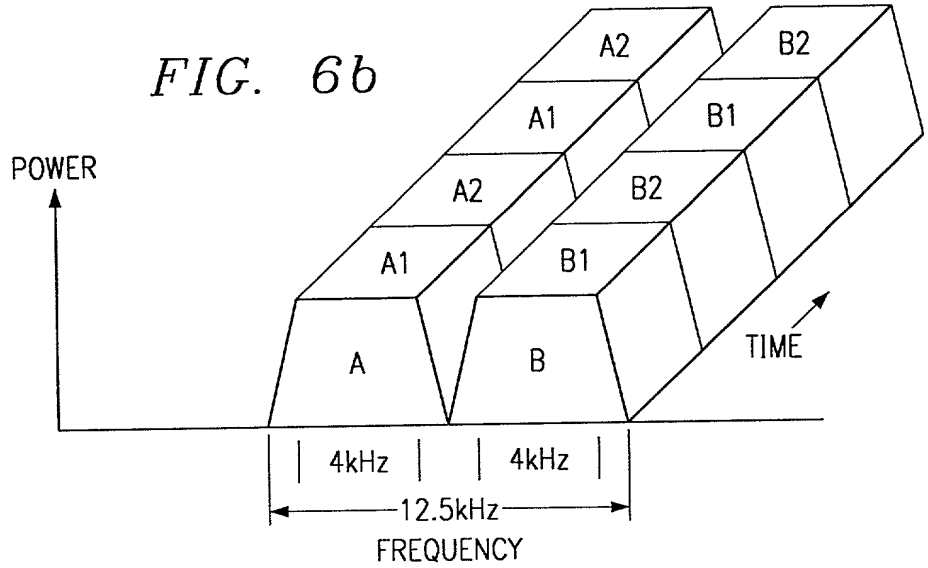


FIG. 6a

FIG. 6b



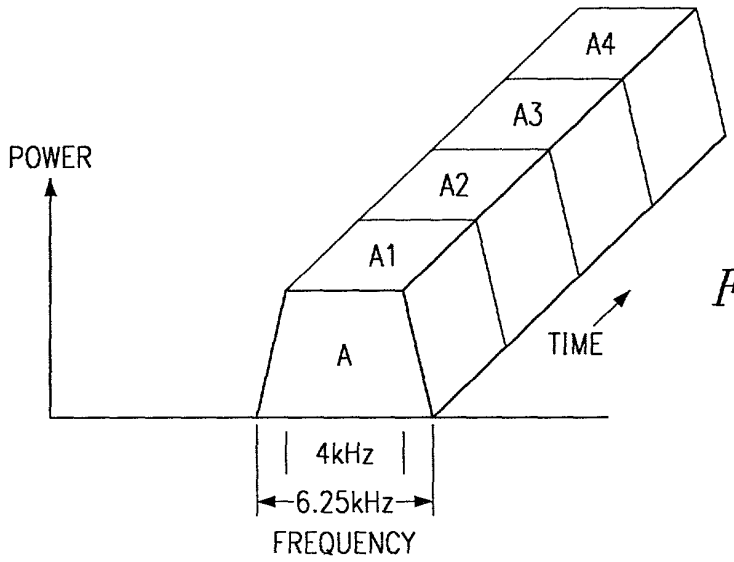


FIG. 6c

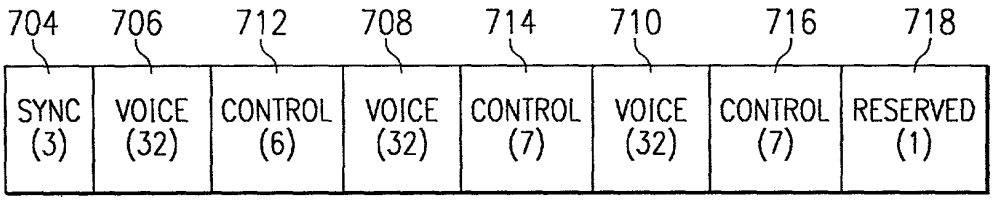


FIG. 7a

702

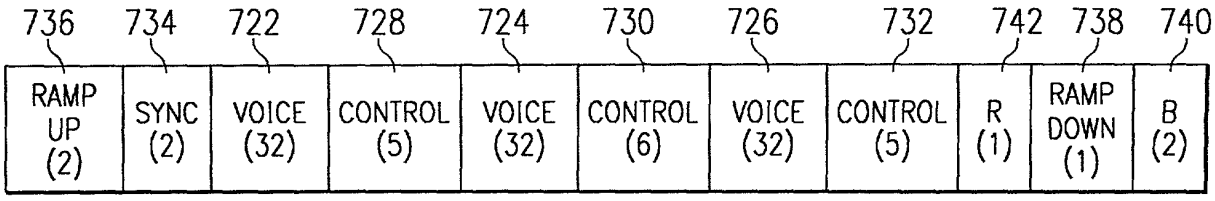


FIG. 7b

720

STAR QAM, 30msec SLOT, OUTBOUND, LTR																									
SLOT NUMBER	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	SUM BY FUNCTION
PRIMARY ERROR CONTROL WORD#	0	0	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9	10	10	11	11	
LTR WORD#	0	0	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9	10	10			
CRC BITS	6	5	6	5	6	5	6	5	6	5	6	5	6	5	6	5	6	5	6	5	6	5	6	5	132
LTR BITS	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	0	0	264
LTR FREQ. EXPAN.	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	0	0	198
SYSTEM CONTROL	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	29	29	234
COUNTER/BATT. SAVE	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	48
RED/BLUE DEFINITION	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	12
INFORMATION BITS IN SLOT	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	
CODED BITS IN SLOT	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	
POWER CONTROL INCREMENT	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	72
CODED PCI BITS IN SLOT	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	144
TOTAL BITS IN SLOT	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	1920

FIG. 7c

CATEGORY	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
SERVICE OPTION	0	0	0	0	s11	s10	s9	s8	s7	s6	s5	s4	s3	s2	s1	s0
FREQUENCY	0	0	0	1	0	f10	f9	f8	f7	f6	f5	f4	f3	f2	f1	f0
BASE SYSTEM GAIN	0	0	1	0	0	0	0	0	0	g6	g5	g4	g3	g2	g1	g0

FIG. 7e

STAR QAM, 30msec SLOT, INBOUND, LTR		
SLOT NUMBER	0	1
ERROR CONTROL WORD#	0	1
LTR WORD#	0	0
CRC BITS	7	7
LTR BITS	12	12
LTR FREQ. EXPAN.	5	4
SYSTEM CONTROL	5	6
SLOT COUNTER	1	1
POWER INDICATOR	2	2
INFORMATION BITS IN SLOT	32	32
CODED BITS IN SLOT	64	64

FIG. 7d

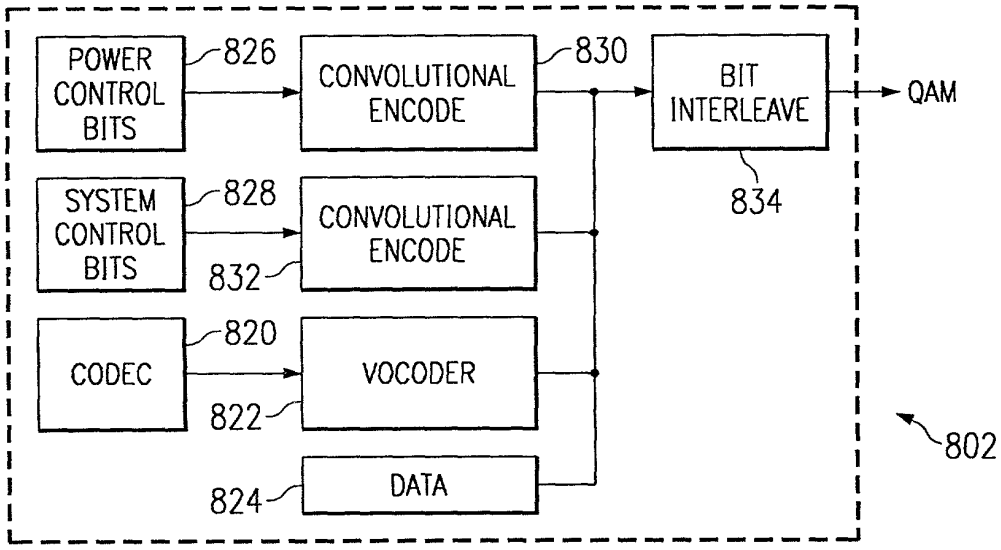


FIG. 8b

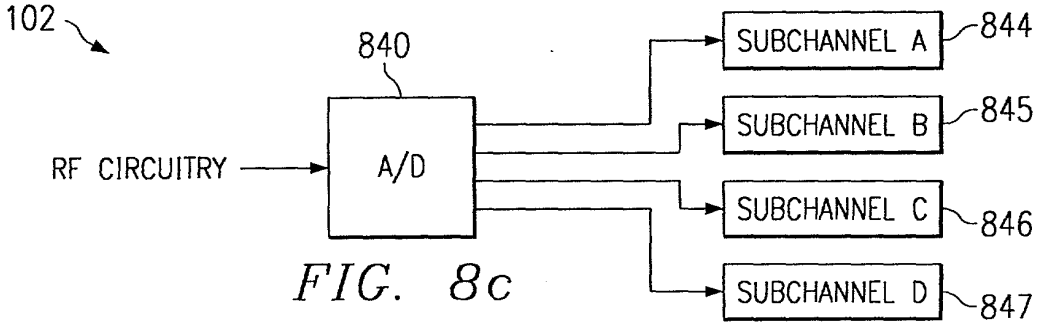


FIG. 8c

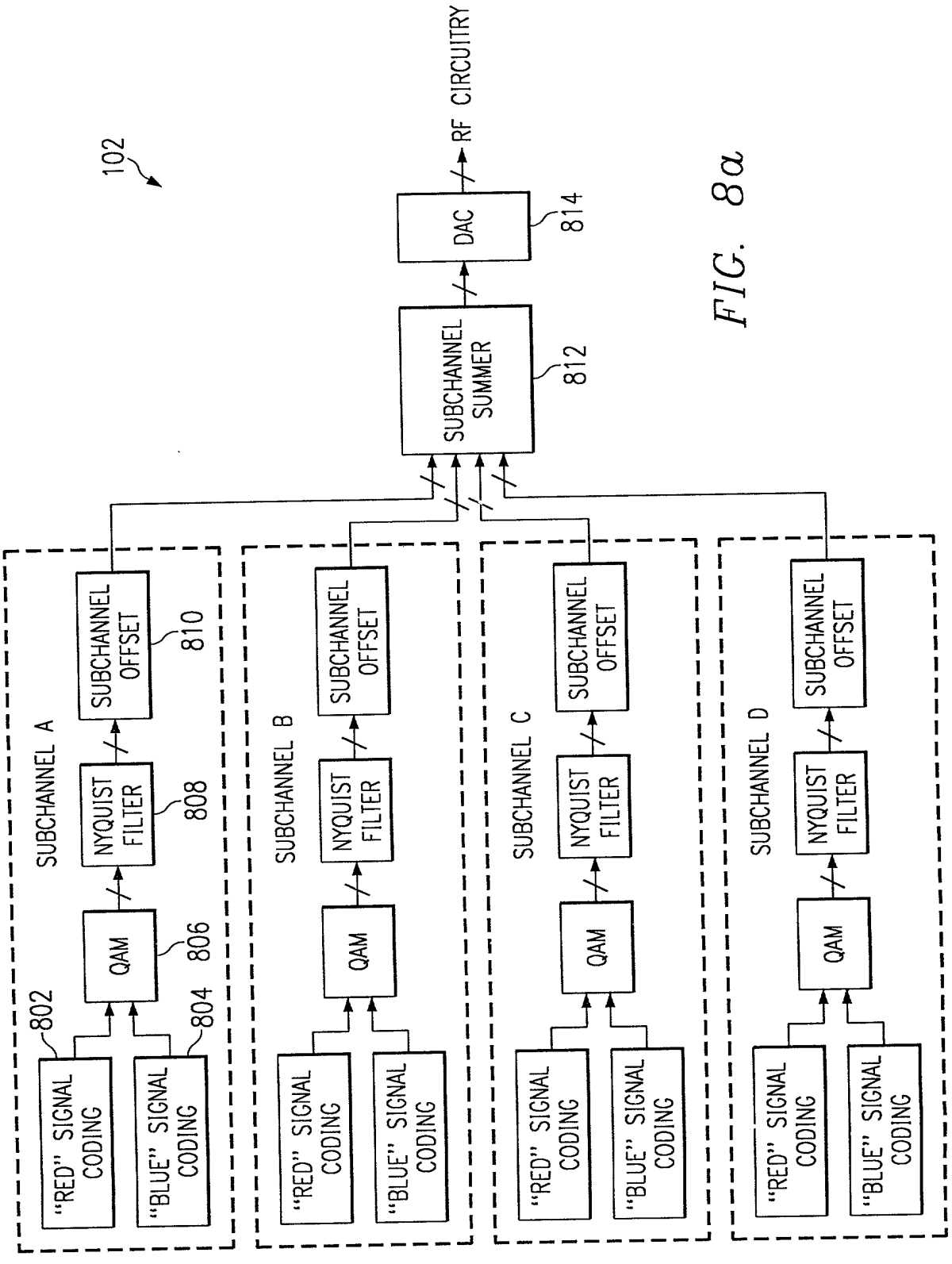

102
RF CIRCUITRY
DAC
814
SUBCHANNEL SUMMER
812
SUBCHANNEL A
"RED" SIGNAL CODING
"BLUE" SIGNAL CODING
802
804
QAM
806
NYQUIST FILTER
808
SUBCHANNEL OFFSET
810
SUBCHANNEL B
"RED" SIGNAL CODING
"BLUE" SIGNAL CODING
QAM
NYQUIST FILTER
SUBCHANNEL OFFSET
SUBCHANNEL C
"RED" SIGNAL CODING
"BLUE" SIGNAL CODING
QAM
NYQUIST FILTER
SUBCHANNEL OFFSET
SUBCHANNEL D
"RED" SIGNAL CODING
"BLUE" SIGNAL CODING
QAM
NYQUIST FILTER
SUBCHANNEL OFFSET

FIG. 8a

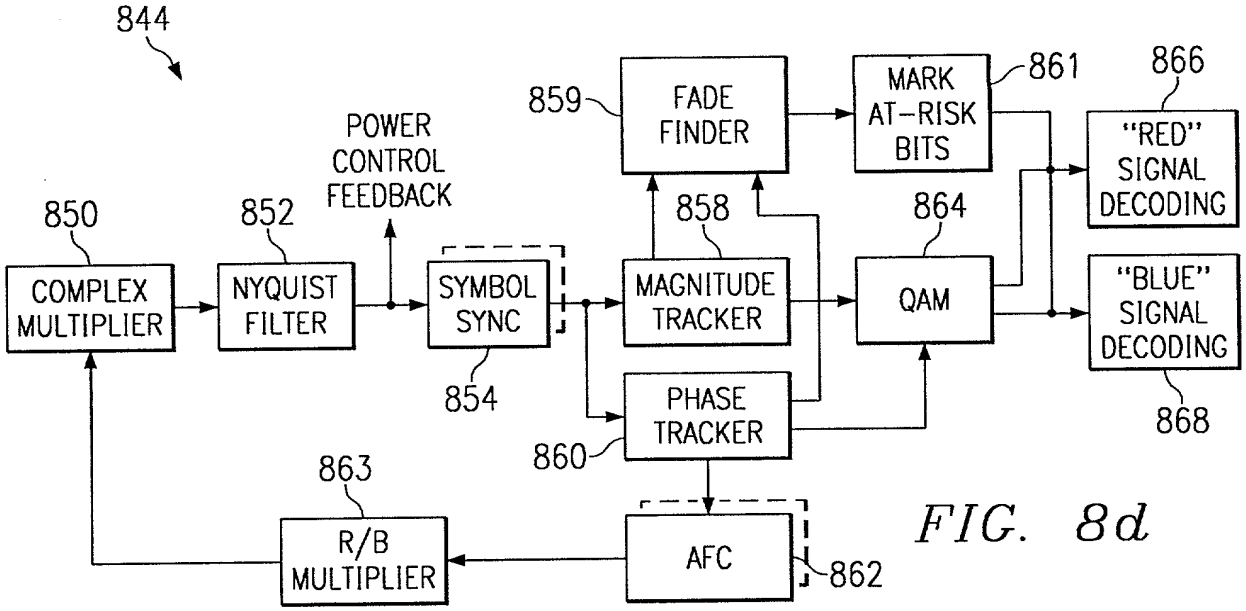


FIG. 8d

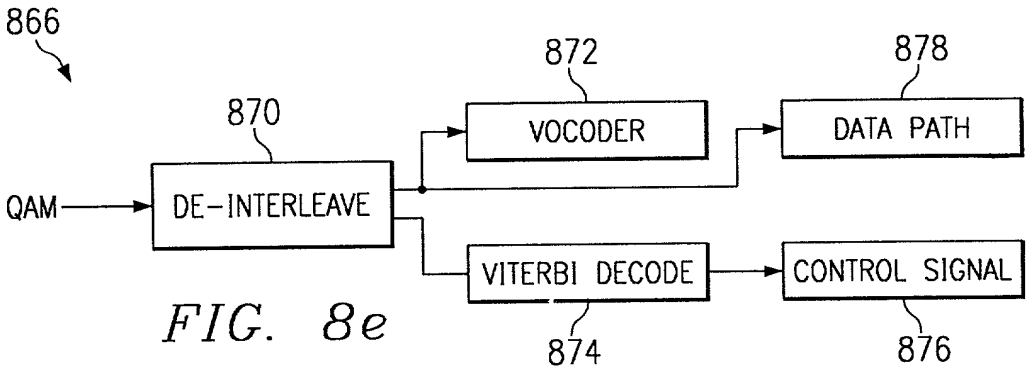


FIG. 8e

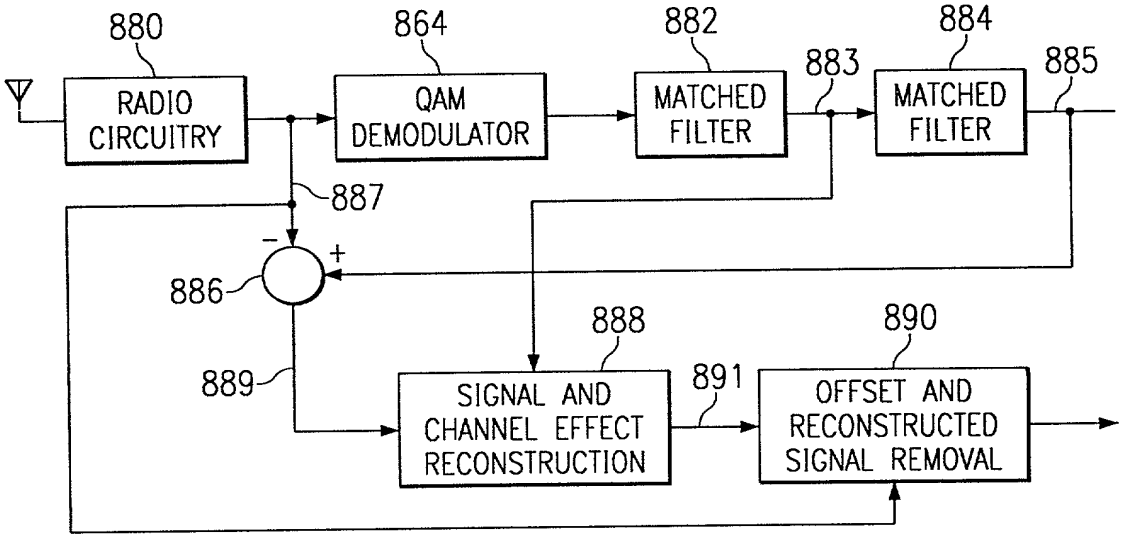


FIG. 8f

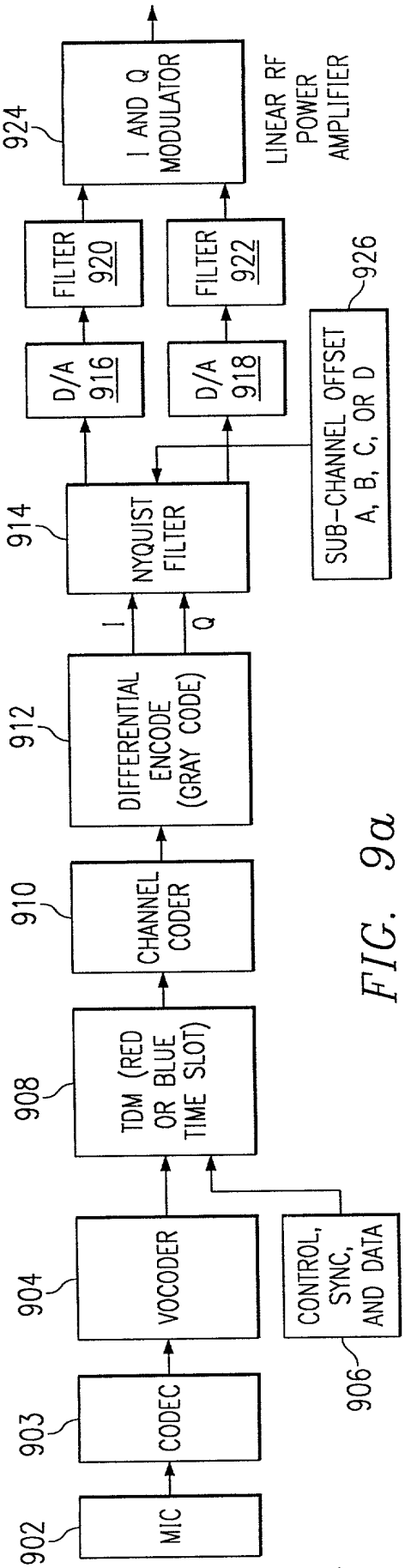

902
MIC
903
CODEC
904
VOCODER
906
CONTROL, SYNC, AND DATA
908
TDM (RED OR BLUE TIME SLOT)
910
CHANNEL CODER
912
DIFFERENTIAL ENCODE (GRAY CODE)
I
Q
914
NYQUIST FILTER
926
SUB-CHANNEL OFFSET A, B, C, OR D
D/A 916
D/A 918
FILTER 920
FILTER 922
924
I AND Q MODULATOR
LINEAR RF POWER AMPLIFIER

FIG. 9a

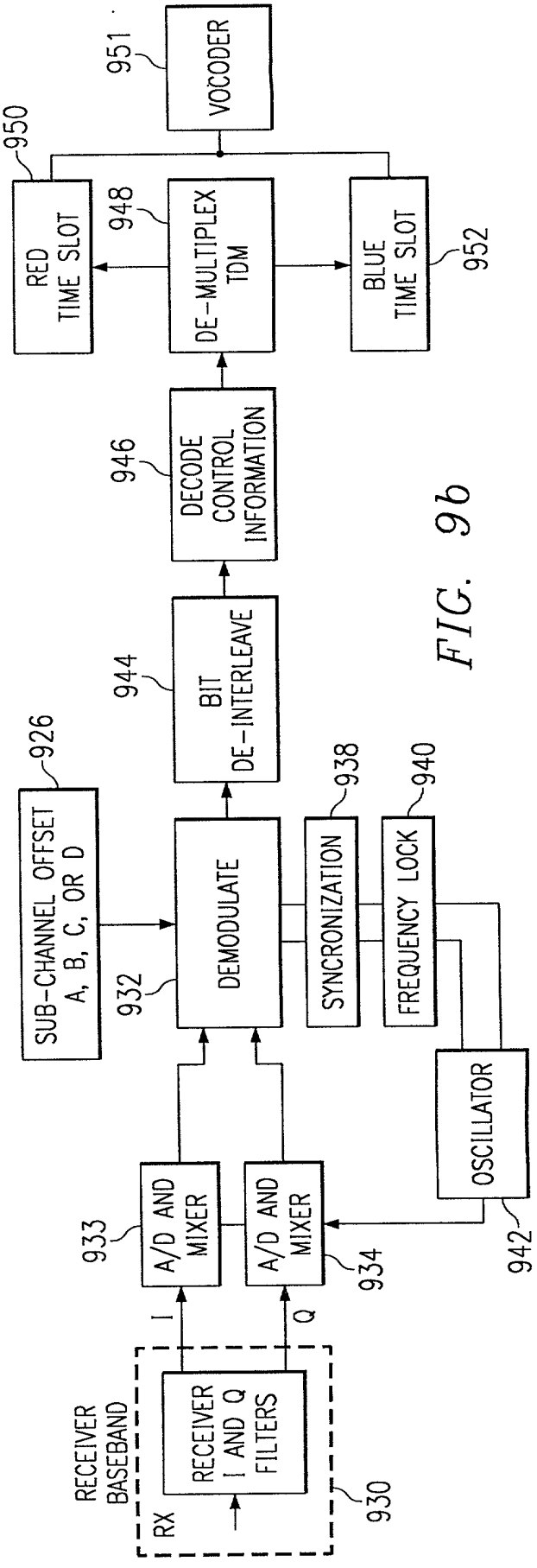

RECEIVER BASEBAND
RX
930
RECEIVER I AND Q FILTERS
I
Q
933
A/D AND MIXER
934
A/D AND MIXER
942
OSCILLATOR
932
DEMODULATE
938
SYNCRONIZATION
940
FREQUENCY LOCK
926
SUB-CHANNEL OFFSET A, B, C, OR D
944
BIT DE-INTERLEAVE
946
DECODE CONTROL INFORMATION
948
DE-MULTIPLEX TDM
950
RED TIME SLOT
952
BLUE TIME SLOT
951
VOCODER

FIG. 9b

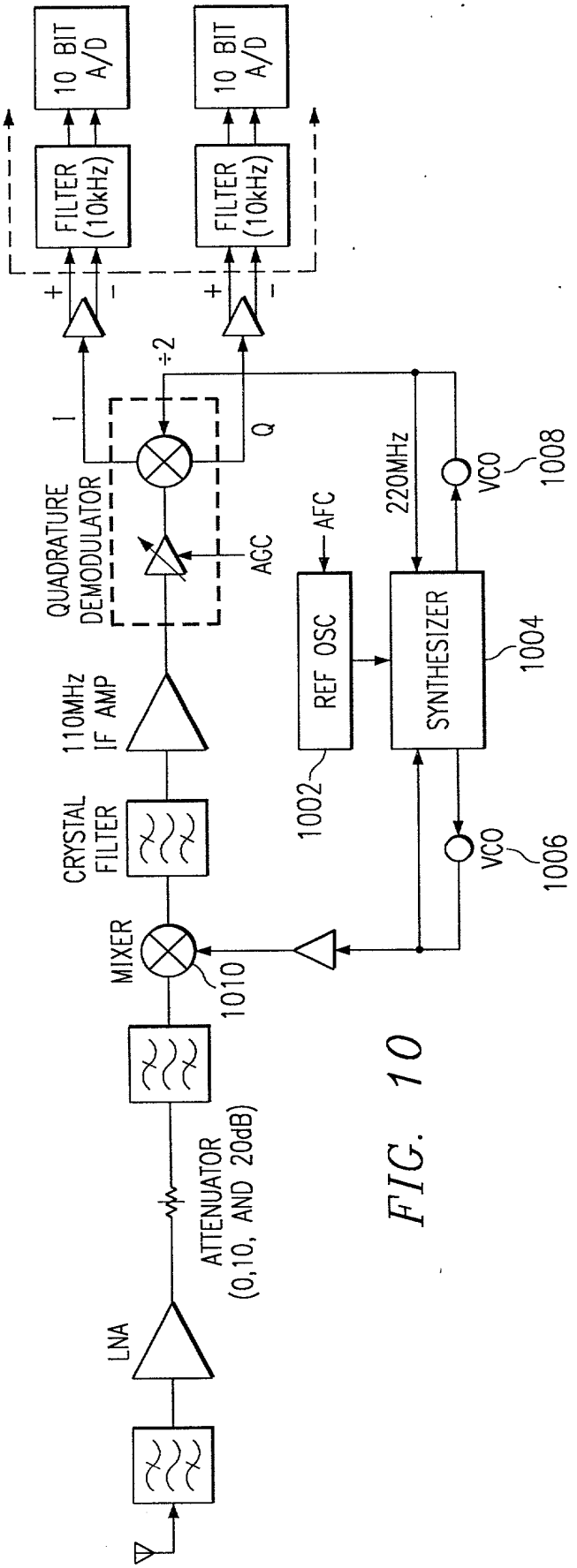

10 BIT A/D
10 BIT A/D
FILTER (10kHz)
FILTER (10kHz)
+
-
+
-
÷2
I
Q
QUADRATURE DEMODULATOR
AGC
AFC
220MHz
VCO
1008
110MHz IF AMP
REF OSC
SYNTHESIZER
1004
CRYSTAL FILTER
1002
VCO
1006
MIXER
1010
ATTENUATOR (0,10, AND 20dB)
LNA

FIG. 10